

## ABSTRACT

The present invention provides an isolated or purified antibody or antigenically-reactive fragment thereof that specifically binds to a C-terminal phosphorylated serine in an H2A histone protein and a product comprising the same. The present invention further provides fusion proteins comprising the isolated or purified antibody or antigenically-reactive fragment thereof. Also provided by the present invention are a method and a kit for determining double-stranded breaks in DNA. The method comprises contacting a sample comprising H2A histone proteins with the isolated or purified antibody or antigenically-reactive fragment thereof and detecting binding of the antibody or fragment thereof to an H2A histone protein in the sample. The detection of the binding of the antibody or fragment thereof to the H2A histone protein indicates the presence of a DNA double-stranded break in DNA.